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*THE TRIFID NEBULA IN SAGITTARIUS.
Photographed with the Crossley Reflector
of the Lick Observatory.*

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PHOTOGRAPH OF THE TRIFID NEBULA, IN
SAGITTARIUS.

BY JAMES E. KEELER.

The "Trifid" Nebula, *Messier 20*, in *Sagittarius*, is one of the most beautiful and remarkable of the irregular nebulae. Its name is derived from the appearance which it presents in visual telescopes, and more particularly from the description of Sir JOHN HERSCHEL:—

"One of them [several nebulae in *Sagittarius*] is singularly trifid, consisting of three bright and irregularly formed nebulous masses, graduating away insensibly externally, but coming up to a great intensity of light at their interior edges, where they inclose and surround a sort of three-forked rift, or vacant area, abruptly and uncouthly crooked, and quite void of nebulous light. A beautiful triple star is situated precisely on the edge of one of these nebulous masses just where the interior vacancy forks out into two channels. A fourth nebulous mass spreads like a fan or downy plume from a star at a little distance from the triple nebula."*

Numerous drawings of the Trifid Nebula have been published. Two by LASSELL in the *Memoirs of the Royal Astronomical Society* represent the brightest parts of nebula very well. There is a good drawing by TROUVELOT, showing the whole nebula, among the astronomical drawings in volume VIII of the *Annals of the Harvard College Observatory*. It has been copied into a number of popular books on astronomy.

The photogravure of the Trifid Nebula which accompanies the present article was made from a photograph taken with the Crossley reflector on the night of July 6, 1899. The exposure given to the original negative was three hours. The enlarge-

* "Outlines of Astronomy," p. 611.

ment of the photogravure, as compared with the negative, is 2.9 diameters, and $1^{\text{mm}} = 13$ seconds of arc.

The photograph agrees well with the drawings, but it shows very much more than they do. The three main rifts referred to in Sir JOHN HERSCHEL'S description are seen, ramifying in all directions, like the roots of a tree, and may be traced nearly to the limits of the plate. Besides these rifts, there are many others, extending through the fainter part of the nebula, which in TROUVELOT'S drawing is represented by a uniform patch of nebulosity.

The triple star, referred to by HERSCHEL, and shown in the different drawings which have been mentioned, is, on the photograph, lost in the bright patch of nebulosity bordering on two of the main rifts. It is visible on the negative, but could not be brought out on the enlargement.

According to Dr. HOLDEN, the observations and drawings of this nebula afford strong evidence that there has been a change in the relative position of the nebula and some of the involved stars. A drawing by HERSCHEL in the *Philosophical Transactions* (1833) shows the triple star in the middle of the dark space formed by the three principal lanes, and in several early observations the star is stated to have this position. Later observations and drawings place the star just within the outline of the nebula. But Dr. DREYER has pointed out that the drawing of 1833 was constructed from sketches "the rudest imaginable, aided by memory," while the observations were made under unfavorable circumstances. A drawing made by Sir JOHN HERSCHEL in 1835 shows the star in its present position. The change, if there was one, must have occurred suddenly, which is not, in general, the nature of cosmical changes. Since 1835 there has been no change in the relative positions of the star and the nebula. In all probability, therefore, the inferred proper motion of the nebula is illusory.

It is certain that the more frequently one has to compare drawings and photographs of nebulae, the less one is inclined to attach weight to evidence based on the drawings.